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ABSTRACT

This document reports on student outcomes in developmental English and mathematics courses at Germanna Community College (Virginia) for the academic period 1994-2000. The study addressed four main issues: (1) the proportion of students enrolled in developmental math and English courses; (2) the success rate for students in developmental courses; (3) the success in college-level courses of students who took developmental courses; and (4) the effect of enrolling in developmental courses on student persistence. Results indicate that: (1) during the reporting period between 35 and 40% of new students were recommended for developmental coursework, and between 50 and 60% of these students enrolled in a developmental course; (2) the proportion of students recommended for and enrolling in developmental math courses is substantially greater than the proportion of developmental English students; (3) approximately 60% of the students who enroll for developmental math and English courses complete them satisfactorily; (4) students who chose not to enroll in developmental math were more successful in their collegiate math course, even when a developmental course was recommended; and (5) enrollment in a developmental course does not make a student more or less likely to persist toward a degree or certificate. (Contains 11 tables.) (EMH)

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ED 459 900

Germanna Community College

Student Outcomes in Developmental Education

1994-95 through 1999-2000

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Germanna Community College

Student Outcomes in Developmental Education, 1994-95 through 1999-2000

This report documents student outcomes in developmental English and mathematics courses for the academic years 1994-95 through 1999-2000. The report provides data to answer four questions:

- What proportion of students enroll in developmental courses?
- What is the success rate for students enrolled in developmental courses?
- What success do students have in completing college-level courses following their developmental coursework?
- Does enrollment in developmental courses impact the likelihood that a student will take further courses and/or complete a degree or certificate?

Data for this report is drawn from the Virginia Community College System Research and Assessment Data Support System (RADSS), as part of the ongoing student outcomes assessment process at Germanna. This report includes final figures through the 1999-2000 academic year. The present report is limited to student outcomes, and does not include data on overall developmental course enrollment trends or assignment of instructional faculty.

The purpose of the present report is to stimulate discussion within the Germanna community regarding the quality and effectiveness of developmental education. It should be noted at the outset that this report does not present recommendations for action; such recommendations—where appropriate—should be developed by the instructional and student support units of the College. The report does conclude with some suggestions of possible issues for further study.

What proportion of students enroll in developmental courses?

Most students entering Germanna Community College complete an initial assessment of their readiness for college-level work. At Germanna, this assessment is primarily concerned with two skill areas: English language skills (both writing and reading) and mathematics. The assessment is accomplished through various means: students may complete a local placement test (the College has used primarily the Compass and Asset tests developed by ACT, Inc. for several years); the student may provide scores on the SAT or ACT college entrance examinations; or the student may present evidence of prior college-level coursework. On the

basis of the initial assessment, students are recommended for enrollment in either college-level or developmental courses. Although demonstrated preparation is considered a "requirement" for enrollment in many college-level courses, it is not always possible to enforce that requirement; for the purposes of this report, discussion will focus on whether students are "recommended" for developmental coursework, and on whether they actually enroll. Table 1 gives initial figures for the proportion of students in each category.

Table 1.
Students recommended for and enrolling in developmental coursework

Academic Year	New Students[1]	Recommended for Developmental		Enrolling in Developmental[2]		Rec. Students Who Enroll	
1994-95	1680	628	37.4%	442	26.3%	365	58.1%
1995-96	1839	689	37.5%	457	24.9%	367	53.3%
1996-97	2220	787	35.5%	533	24.0%	460	58.4%
1997-98	2462	859	34.9%	593	24.1%	507	59.0%
1998-99	2517	990	39.3%	639	25.4%	561	56.7%
1999-2000	2523	967	38.3%	552	21.9%	501	51.8%

[1] New students are students enrolling at Germanna for the first time during the academic year.

[2] Enrollment in developmental courses was not necessarily during the first academic year.

In general, during the reporting period between 35% and 40% of new students were recommended for developmental coursework, and between 50% and 60% of these students enrolled in a developmental course. Some students who were not recommended for developmental enrolled in those courses anyway, so that altogether approximately 25% of all new students enrolled in developmental courses during the reporting period. These initial figures are somewhat misleading, however, due to the wide variations in enrollment patterns among Germanna students. There are several cases in which an entering student may not be assessed for placement in college-level courses. In addition, the present analysis is based only on computer records available through the student information system. These two factors combined exclude several groups of students:

- Students who have not yet declared a curriculum and have taken only a few courses on a part-time basis may not have placement scores on their record.
- Students who first enroll at Germanna as high school students may not have submitted their placement test scores for entry in the information system.

- Students who transfer to Germanna from another college, or who have completed previous college-level coursework, may be advised to enroll in a college-level course without having placement scores on their record.

To compensate for at least the first two of these situations, *the remainder of this analysis will be limited to curriculum-placed students*. Table 2 provides figures on developmental enrollment for curriculum-placed students only.

Table 2.
Students recommended for and enrolling in developmental coursework
(Curriculum-placed students only)

Academic Year	New Students[1]	Recommended for Developmental		Enrolling in Developmental[2]		Rec. Students Who Enroll	
1994-95	739	429	58.1%	307	41.5%	264	61.5%
1995-96	784	454	57.9%	337	43.0%	277	61.0%
1996-97	972	567	58.3%	402	41.4%	352	62.1%
1997-98	1057	612	57.9%	431	40.8%	382	62.4%
1998-99	1210	742	61.3%	518	42.8%	462	62.3%
1999-2000[3]	1091	697	63.9%	432	39.6%	395	56.7%

[1] New students are students enrolling at Germanna for the first time during the academic year.

[2] Enrollment in developmental courses was not necessarily during the first academic year.

[3] The smaller number of new curriculum-placed students for 1999-2000 does not indicate a decline in enrollment, but rather is reflective of students' delay in declaring a curriculum.

As the table indicates, the proportion of students recommended for developmental coursework is much higher when only curriculum-placed students are considered. The difference is attributable primarily to the fact that these students are more likely to have placement test scores on file. In addition, the table indicates that the proportion of students recommended for developmental courses has increased during the last two academic years. There are a number of factors that might explain this increase, including changes in the placement test threshold levels for college courses and changes in the student population. (It is also important to note that students may change their declared curriculum at any time, so that the proportions in the table will change; this would especially impact the figure for the 1999-2000 academic year, with many students newly enrolled and not yet having declared a curriculum.) The present report will not

investigate these factors; however, such an analysis would be useful for a better understanding of the placement and developmental coursework process.

At Germanna, students are recommended for developmental coursework in two disciplines, English and math, and a much higher proportion of students are recommended for developmental math than for English. Table 3 documents the respective proportions of curriculum-placed students recommended for and enrolling in developmental courses in each discipline.

Table 3.
Students recommended for and enrolling in developmental coursework, by developmental course discipline (Curriculum-placed students only)

Developmental Math

Academic Year	New Students[1]	Recommended for Developmental		Enrolling in Developmental[2]		Rec. Students Who Enroll	
1994-95	739	409	55.3%	276	37.3%	232	56.7%
1995-96	784	420	53.6%	320	40.8%	250	59.5%
1996-97	972	543	55.9%	379	39.0%	320	58.9%
1997-98	1057	588	55.6%	403	38.1%	350	59.5%
1998-99	1210	669	55.3%	445	36.8%	379	56.7%
1999-2000	1091	625	57.3%	360	33.0%	321	51.4%

Developmental English

Academic Year	New Students[1]	Recommended for Developmental		Enrolling in Developmental[2]		Rec. Students Who Enroll	
1994-95	739	107	14.5%	67	9.1%	61	57.0%
1995-96	784	96	12.2%	62	7.9%	55	57.3%
1996-97	972	142	14.6%	99	10.2%	86	60.6%
1997-98	1057	132	12.5%	93	8.8%	81	61.4%
1998-99	1210	302	25.0%	160	13.2%	143	47.4%
1999-2000	1091	323	29.6%	162	14.8%	146	45.2%

[1] New students are students enrolling at Germanna for the first time during the academic year.

[2] Enrollment in developmental courses was not necessarily during the first academic year.

Table 3 indicates that the proportion of students recommended for and enrolling in developmental math courses is substantially greater than the proportion of developmental English students. The table also indicates that the proportion of students recommended for

developmental English doubled in 1998-99 over previous levels. This is likely due in large part to a significant change in the cutoff score on the placement reading exam, which took effect in April 1998, and the creation of an additional corresponding developmental reading course. However, at the same time, the proportion of students recommended for developmental English who actually enrolled decreased, as many of the newly identified "developmental" students apparently did not follow through in their enrollment. (It is not possible in the present analysis to make an exact match between the developmental course a student took and the one for which he or she was recommended.)

Despite the substantial numbers of students recommended for and enrolling in developmental courses, the aggregate enrollment in those courses is relatively small. Between 1994-95 and 1999-2000, all developmental courses combined represented less than 6% of total course registrations at the College, and approximately 6% of total credit hours earned. Within the specific disciplines where developmental courses are offered, however, the pre-collegiate courses comprise a higher percentage. Developmental English courses ranged in frequency from 5.3% to 10.0% of annual total English course registrations during the period, with the highest proportion coming during 1999-2000. Developmental math courses were a much more significant proportion, representing between 36.3% and 39.9% of total math registrations, with no clear trend.

Summary

1. Not all incoming students are assessed for college-level readiness; for the purpose of this analysis, it is most appropriate to focus on curriculum-placed students only.
2. Approximately 60% of curriculum-placed students are recommended for developmental coursework, and approximately 60% of those students actually enroll. Combined with the "non-recommended" students, approximately 40% of curriculum-placed students enroll in developmental courses.
3. Students are much more likely to be recommended for developmental math than for developmental English. The proportion of students recommended for developmental English has increased in the last two years, however, likely due to a change in the reading placement test cutoff score.
4. Developmental courses comprise only about 6% of total College offerings, although they represent a more substantial proportion of math course registration.

What is the success rate for students enrolled in developmental courses?

This section compiles information on curriculum-placed students who enrolled in developmental math and English courses between 1994-95 and 1999-2000 and the grades they received in those courses. Students in developmental courses receive grades of "Satisfactory", "Unsatisfactory" or "Re-enroll"; they may also receive incomplete, withdrawal, or audit grades. Tables 4 and 5 present the results of developmental courses in math and English, respectively.

Table 4.
Grade outcomes in developmental math courses
(Curriculum-placed students only)

Year	MTH 03[1]				MTH 04				All Developmental Math			
	Recommended		Not Recommended		Recommended		Not Recommended		Recommended		Not Recommended	
	No.[2]	% 'S'	No.	% 'S'	No.	% 'S'	No.	% 'S'	No.	% 'S'	No.	% 'S'
1994-95	196	66.8	40	57.5	136	62.5	35	65.7	332	65.1	75	61.3
1995-96	209	70.8	56	73.2	117	69.2	33	75.8	363	69.4	98	73.5
1996-97	254	57.1	47	66.0	135	63.7	29	65.5	440	61.1	88	68.2
1997-98	268	60.1	47	66.0	154	58.4	37	45.9	479	62.2	104	57.7
1998-99	353	64.9	48	52.1	208	65.9	40	70.0	624	67.0	104	64.4
1999-00	355	54.1	48	70.8	246	62.6	40	60.0	643	58.0	103	63.1
Total	1635	61.5	277	64.6	996	63.6	214	63.6	2881	63.4	572	64.7

[1] MTH 03 and MTH 04 are the only developmental math courses with sufficient numbers of students enrolled who were not recommended for developmental math. "All Developmental Math" includes MTH 01, MTH 02, and MTH 05 as well.

[2] "No." is the total count of all student enrollments. '% S' is the percentage of all students receiving a grade of Satisfactory.

The purpose of the tables in this section is not to compare student success rates over time, nor is it to imply that there is a certain proportion of students in developmental courses who should complete satisfactorily. The purpose is solely to indicate what proportion of students who do enroll in developmental courses does complete them successfully. Table 4 indicates that this proportion among students in developmental math courses is approximately 60%. There does not appear to be a significant difference in success rates between the specific courses, although the proportion of students receiving an 'S' for MTH 02 and MTH 05 (not shown in the table) is somewhat higher. Further, there does not appear to be a significant difference in success rates

between students who enrolled after being recommended for a developmental course, and students who were not recommended.

Additional analysis shows that some of the course grades shown above are for students who are repeating the same developmental course. Repeats comprise approximately 9% of the developmental math course grades in this table. Approximately 44% of the students who are repeating a developmental math course complete it satisfactorily on the second attempt. (This proportion among repeat students is included in the overall figures provided in the table, but does not produce a significant effect due to the small number of cases.)

Although a direct comparison is not warranted, it may be of interest to look at a similar success rate for curriculum-placed students in college-level math courses. For all MTH courses numbered 100 or higher, approximately 75% of students received a grade of 'C' or better during this period.

Table 5.
Grade outcomes in developmental English courses
(Curriculum-placed students only)

	ENG 01[1]				ENG 04				All Developmental English			
Year	Recommended		Not Recommended		Recommended		Not Recommended		Recommended		Not Recommended	
	No.[2]	% 'S'	No.	% 'S'	No.	% 'S'	No.	% 'S'	No.	% 'S'	No.	% 'S'
1994-95	56	71.4	6	100.0	9	100.0	0	0.0	65	75.4	7	100.0
1995-96	49	71.4	4	50.0	15	80.0	2	100.0	64	73.4	6	66.7
1996-97	73	61.6	10	80.0	17	76.5	3	0.0	90	64.4	13	61.5
1997-98	82	56.1	9	44.4	18	50.0	3	33.3	103	56.3	12	41.7
1998-99	112	65.2	17	76.5	43	48.8	6	50.0	192	57.8	23	69.6
1999-00	131	55.0	14	35.7	62	54.8	3	0.0	246	53.7	22	50.0
Total	503	61.8	60	63.3	164	59.8	17	47.1	760	59.9	83	61.4

[1] ENG 01 and ENG 04 are the only developmental English courses with sufficient numbers of students enrolled who were not recommended for developmental English—and even for those courses, the number of students in a single year is really too small for percentages to be meaningful. "All Developmental English" includes ENG 06, ENG 07, and ENG 09 as well.

[2] "No." is the total count of all student enrollments. "% S" is the percentage of all students receiving a grade of Satisfactory.

The proportion of students completing developmental English courses satisfactorily is similar to that for developmental math, at approximately 60%. (Percentages in Table 5 vary more

widely due to the smaller number of cases.) However, it does appear that the number of students recommended for developmental English increased substantially during the last two academic years, likely due primarily to the changed placement test threshold mentioned in the previous section. At the same time, during the last three academic years the proportion of recommended students completing satisfactorily has been lower than the proportion in earlier years. The limited number of cases for analysis suggests only that this trend bears further observation.

Repeat enrollments in developmental English courses comprise only about 7% of the totals shown in the table. Again, approximately 44% of students repeating the developmental course complete it satisfactorily on the second attempt. The comparison rate for students completing college-level English courses with at least a 'C' was 75%.

Summary

- Approximately 60% of the students who enroll for developmental math and English courses complete them satisfactorily. This includes a small number of students who are repeating the developmental course.

What success do students have in enrolling in college-level courses following their developmental coursework?

This final section of the report documents outcomes (in the form of course grades) for students enrolled in the "entry-level" collegiate courses in both math and English, classified according to the students' developmental background. Based on a combination of the results from the previous two sections, the tables in this section classify students according to their "developmental background", comprising two factors:

- Was the student recommended for developmental coursework? and
- Did the student actually enroll in a developmental course?

The section presents results for three areas: College Mathematics, College Composition, and Business Math.

The analysis in this section concerns "success" in specific collegiate-level courses—defined for this analysis as receiving a grade of 'C' or better—for students separated into four different categories of developmental background. At the outset, it should be noted that *a majority of the students in these collegiate courses are successful*, based on this measure. This statement holds whether the students enrolled in a developmental course or not, and whether they were recommended for developmental courses or not. Therefore, the bulk of the analysis that follows

concerns possible *differences* in the success rates of students, based on their identified developmental status. Such differences might indicate that not all students are receiving the most appropriate course placement—although it must be acknowledged that this ideal goal is not likely attainable.

College Mathematics (MTH 151 and MTH 163)

For the purpose of this analysis, two of the Germanna math classes are designated as "entry-level" collegiate courses: MTH 151, Math for the Liberal Arts I; and MTH 163, Pre-Calculus I.[1] These two courses, along with the developmental MTH 03, 04, and 05, are the most common enrollments for students providing placement test scores. The outcomes for MTH 151 and MTH 163 are grouped together throughout, as students rarely complete both courses. As in the previous sections, results presented here are based on curriculum-placed students only, which excludes the many high school dual-enrollment students who take MTH 163 each year. The analysis is based on two different "outcome" measures in the collegiate courses: The proportion of students receiving a letter grade of 'C' or better in the collegiate course; and the average grade in the course (on the 4-point GPA scale). Not all combinations of all these measures are presented in this report, but further tables are available from the Office of Research and Planning.

[1] MTH 120 "Introduction to Mathematics" also fits the technical definition of a "college-level" course, since it is offered at the 100-level. However, the placement test threshold for MTH 120 has generally been the same as that for the developmental MTH 03.

Table 6.
Grade outcomes in collegiate math courses (MTH 151/163), by developmental math background
(Curriculum-placed students only)

Year	Recommended[1]					Not Recommended				
	Enrolled[1]		Did Not Enroll			Enrolled		Did Not Enroll		
	No.	% Pass[2]	No.	% Pass	Sig.[3]	No.	% Pass	No.	% Pass	Sig.
1994-95	118	69.5	38	78.9		28	71.4	88	79.5	
1995-96	103	68.0	41	82.9		38	63.2	83	85.5	*
1996-97	113	76.1	29	93.1	*	23	65.2	97	77.3	
1997-98	124	75.0	39	82.1		22	77.3	112	83.0	
1998-99	132	66.7	32	65.6		29	79.3	151	82.8	
1999-00	159	63.5	36	66.7		31	54.8	167	82.0	*
Total	749	69.4	215	78.1	*	171	67.8	698	81.8	*

[1] "Recommended" or "Not Recommended" for developmental math. "Enrolled" or "Did Not Enroll" in any developmental math course. This table does not specify whether the student enrolled in the specific recommended developmental course, or whether the student completed the developmental course successfully.

[2] '% Pass' is the percentage of students in the category receiving a grade of 'C' or better in MTH 151 or MTH 163.

[3] Statistical significance: a '*' in this column indicates that there is a statistically significant relationship between enrollment in a developmental course and the proportion of students completing successfully (O^2 test at $p < .05$).

Table 6 presents "success" rates for all curriculum-placed students who took either MTH 151 or MTH 163 during the period, classified according to their background of placement into and enrollment in developmental math. The table indicates a potential issue in the placement of students in developmental classes, at least among the students who did enroll in these collegiate math courses. The primary comparison in the table is in the success rates between students who enrolled in developmental math courses and those who did not; the table separates those who enrolled when they were recommended to do so, and those who enrolled even when this was not recommended. In either case, the success rate of students who did *not* enroll in a developmental math course was *higher*, which indicates a possible misplacement of students into developmental courses. The pattern of higher rates of success is consistent throughout the table, although most of the differences for specific years do not reach a level of statistical significance. (This is likely due to the relatively small number of cases.) When all the enrollments during the period are taken together, however, the difference is both clear and statistically significant. Ideally, one would hope to see that students who have completed a developmental course are just as likely to

succeed in collegiate courses as the students who enrolled directly in those courses, and that does not appear to be the case.

The better results in the collegiate math courses among students who did not enroll in developmental courses are also documented when the actual grades are calculated for the collegiate course. Among students who were recommended for developmental math, those who actually enrolled achieved an average grade of 2.46 on the 4-point scale. Those who did *not* enroll scored an average of 2.67, and the difference is statistically significant. (Statistical significance here is measured by a two-tailed t-test comparison of the mean grades, $p < .05$) Among those not recommended for developmental, the pattern was the same: Enrollees averaged a 2.51 GPA in the collegiate course, compared with 2.87 among those who did not enroll.

That this statistical result indicates a possible misplacement of students into developmental courses can be explained as follows: Among students who were recommended for developmental math, those who did not enroll in a developmental course were able to complete the collegiate math course at higher rates and with higher average grades than those who did enroll in developmental. This indicates that many of these students probably should not have been placed into developmental math. However, one weakness of the present analysis is that the categorization of students as "recommended" for developmental coursework is based only on placement test scores entered into the student information system. There are at least two reasons why this limitation may exaggerate the apparent "misplacement" of students into developmental courses.

Students who take placement tests have the option of re-taking those tests if they feel their scores are not reflective of their skills; anecdotal information indicates that they do not often do so, however. In addition, many instructors use diagnostic exams at the beginning of their courses. On the basis of this exam, the instructor may recommend that a student enroll in a different course; however, the results of these exams are not included in the student information system data. Thus, a student who scores low on the placement exam may move appropriately into a collegiate course, and complete it successfully, but still remain in the information system as recommended for developmental. The question of the validity of the placement testing process remains, although it is entirely possible that students are being placed into the most appropriate courses by other means.

It has also been suggested that this analytical result could be the product of inadequate preparation in the developmental course. If students who enroll in developmental math courses receive lower grades in their collegiate math courses, it might be that the developmental course is not providing students with the skills necessary to succeed in collegiate math. Table 7 provides some initial information with which to explore this possibility.

Table 7.
Grade outcomes in collegiate math courses (MTH 151/163), by prior developmental math course outcome
(Curriculum-placed students only)

Developmental Math Course	Outcome of Prior Course	MTH 151/163 Outcome		
		No.	% Pass[1]	Avg. Grade
MTH 02	Successful[2]	1	100.0	2.00
	Not Successful	1	0.0	1.00
MTH 03	Successful	122	68.9	2.46
	Not Successful	30	70.0	2.54
MTH 04	Successful	553	71.4	2.55
	Not Successful	73	57.5	2.05
MTH 05	Successful	103	76.7	2.57
	Not Successful	13	30.8	1.23
No Developmental Math		933	80.0	2.81

[1] '% Pass' is the percentage of students receiving a grade of 'C' or better in MTH 151/163.

[2] "Successful" in the developmental math courses is defined as a grade of 'S'.

Table 7 identifies the specific developmental math course which students may have taken prior to enrolling in the collegiate math course, and indicates whether the student completed that developmental course successfully. In this table, the outcome in the developmental course represents the *last* time a student enrolled in a developmental course, and the grade in MTH 151/163 represents the *first* time the student enrolled in that course. The table indicates that students who successfully complete either MTH 04 or MTH 05 perform substantially better in MTH 151/163 than do students who were not successful in the developmental course. (MTH 04 and MTH 05 are listed as the appropriate prerequisites for the collegiate courses.) This result demonstrates a clear positive benefit from those courses, although even the successful

developmental students are not as successful in MTH 151/163 as students who enter those two courses directly. Additionally, it should be noted that the results are not necessarily as strong as might be expected. First, more than half of the students who did not successfully complete MTH 04 were still able to earn at least a 'C' in MTH 151/163 on their first attempt. Second, among students whose last developmental math course was MTH 03, the success rate in collegiate math was not affected by success in the developmental course. In both cases, it is entirely possible that students in the developmental course felt that they had been mistakenly placed at that level, withdrew from the course (after the census date), and then subsequently enrolled in and completed the collegiate course. While this would not represent a "failure" for the student by any means, it does give further evidence that placement into developmental math courses may be subject to significant error. However, at the same time, the analysis does support a closer enforcement of prerequisites, in the sense that students should either complete the developmental course successfully or re-take the placement test if they feel it is in error, in order to maximize their chances for success in the collegiate course.

It must be recognized that a student's enrollment in any course represents a *choice*. While completion of prerequisites is stipulated as a "requirement", there is no absolute enforcement of these prerequisites at present. A student may discuss his or her situation with a faculty advisor, counselor, or the course instructor, and choose to enroll in a course which varies from the placement recommendation. Finally, it should be recognized that mathematics is an area which creates a very real "math anxiety" in many people. The level of a student's confidence, persistence, and effort are intangible variables which are not included in this analysis, but which certainly can have an impact on the student's success.

Summary

- The analysis indicates that students who chose *not* to enroll in developmental math were more successful in their collegiate math course, even when a developmental course was recommended. This suggests that some of these students were misplaced into the developmental math course.
- Specific analysis relating specific developmental and collegiate course outcomes reveals that completion of the developmental course does enhance success in the collegiate course, although not necessarily as strongly as might be desirable.
- The analysis does support a closer enforcement of prerequisites, although with a provision for re-assessment of the student after initial placement. Such a re-assessment should be recorded in the Student Information System.

College Composition (ENG 111)

Table 8.
Grade outcomes in College Composition (ENG 111), by developmental English background
(Curriculum-placed students only)

Year	Recommended[1]					Not Recommended				
	Enrolled[1]		Did Not Enroll			Enrolled		Did Not Enroll		
	No.	% Pass[2]	No.	% Pass	Sig.[3]	No.	% Pass	No.	% Pass	Sig.
1994-95	40	77.5	18	72.2		5	40.0	367	76.3	
1995-96	31	74.2	23	78.3		5	80.0	380	75.8	
1996-97	50	64.0	16	75.0		6	83.3	415	74.0	
1997-98	39	71.8	17	47.1		10	100.0	467	78.6	
1998-99	73	74.0	84	75.0		11	45.5	486	73.7	*
1999-00	81	56.8	109	62.4		13	69.2	490	71.8	
Total	314	68.2	267	68.2		50	70.0	2605	74.9	

[1] "Recommended" or "Not Recommended" for developmental English. "Enrolled" or "Did Not Enroll" in any developmental English course. This table does not specify whether the student enrolled in the specific recommended developmental course, or whether the student completed the developmental course successfully.

[2] '% Pass' is the percentage of students in the category receiving a grade of 'C' or better in ENG 111.

[3] Statistical significance: a '*' in this column indicates that there is a statistically significant relationship between enrollment in a developmental course and the proportion of students completing successfully (O^2 test at $p < .05$).

As in previous sections, Table 8 includes only curriculum-placed students, which excludes a large number of high school dual-enrollment students. The first point to make regarding Table 8 is that a large majority of curriculum-placed students are *not* recommended for developmental English, and most of these students do not enroll. (Of 3,236 students in the table, only 364 or 11.2% enrolled in a developmental English course.) This makes a comparison of success rates in ENG 111 from year to year invalid, as most years do not contain enough cases in the other categories. Over all six years, however, the proportions of successful students in the four background categories end up essentially equal. This indicates that students taking developmental courses do not appear to be at a disadvantage when they enroll in the College Composition course. (As noted previously with regard to Table 3, the number of students recommended for developmental English increased substantially for 1998-99 and 1999-00; the success rates fluctuated during these two years, but remained similar whether the students enrolled in developmental or not.) The analysis of average grades received in the ENG 111

course produces a similar result: no significant difference in the ENG 111 grades received between developmental and non-developmental students.

The results of Table 8 may be somewhat misleading, because the table does not separate students in their developmental background according to recommendation for or enrollment in developmental *writing* courses as opposed to developmental *reading* courses. A further examination of students enrolling in ENG 111 based on their previous enrollment specifically in ENG 01 "Preparing for College Writing" gives some additional evidence. As noted previously, only a few of the students who took ENG 111 during the period had enrolled in the developmental course; in the case of ENG 01, 296 of 3,279 or 9.1%. Nearly all of the students who enrolled in ENG 01 completed it successfully, although a few of them may have repeated the course before doing so. Among the students who successfully completed ENG 01, 68.7% received a grade of 'C' or better in ENG 111. This compares with a success rate of 64.5% among unsuccessful completers of ENG 01, and 71.9% among students who did not take the developmental course. These differences are small, and are not statistically significant. In terms of the average grade received in ENG 111, students who successfully completed ENG 01 received an average grade of 2.34 on the 4-point scale, while students who did not enroll in ENG 01 averaged 2.65. This difference is statistically significant, which shows that the developmental students did receive lower grades on average, even if the majority were still passing grades.

Summary

- The success rate in ENG 111 College Composition is essentially the same for students who enrolled in developmental English as those who did not. This indicates that these students are receiving an appropriate preparation in their developmental course.
- Students successfully completing ENG 01 received slightly lower actual grades, on average, in ENG 111.

Business Math (BUS 121)

Business Math (BUS 121) represents a special case of math placement. For many years, students enrolling BUS 121 were expected to fulfill a prerequisite in math, through either previous coursework or documented placement test scores. Some students were placed in developmental math courses as preparation for the Business Math course. However, based on their experience working with these students, business faculty were concerned that some students enrolling in BUS 121 did not have specific skills needed for that course. As a result, beginning in 1996-97 in collaboration with the business faculty, math instructors began offering the

developmental MTH 02 course specifically as preparation for BUS 121. This section presents evidence of student outcomes in BUS 121 by developmental math background, both in general and related specifically to MTH 02.

Table 9.
Grade outcomes in Business Math (BUS 121),
by developmental math background
(Curriculum-placed students only)

	Recommended[1]					Not Recommended				
Year	Enrolled[1]		Did Not Enroll			Enrolled		Did Not Enroll		
	No.	% Pass[2]	No.	% Pass	Sig.[3]	No.	% Pass	No.	% Pass	Sig.
1994-95	23	60.9	23	60.9		6	66.7	33	75.8	
1995-96	17	64.7	31	80.6		3	100.0	35	80.0	
1996-97	16	56.3	36	80.6		4	75.0	32	93.8	
1997-98	20	55.0	27	70.4		4	100.0	32	90.6	
1998-99	19	73.7	20	70.0		4	75.0	39	89.7	
1999-00	18	88.9	23	69.6		6	66.7	47	87.2	
Total	113	66.4	160	73.1		27	77.8	218	86.2	

[1] "Recommended" or "Not Recommended" for developmental math. "Enrolled" or "Did Not Enroll" in any developmental math course. This table does not specify whether the student enrolled in the specific recommended developmental course, or whether the student completed the developmental course successfully.

[2] '% Pass' is the percentage of students in the category receiving a grade of 'C' or better in BUS 121.

[3] Statistical significance: a '*' in this column indicates that there is a statistically significant relationship between enrollment in a developmental course and the proportion of students completing successfully (O^2 test at $p < .05$).

Table 9 shows results somewhat different from those presented in Table 6. For BUS 121 students who were "not recommended" for developmental math, the table shows a mixed result. Overall, those students who enrolled in developmental math courses were slightly less likely to achieve a 'C' in BUS 121. However, the difference does not hold in all years and is not statistically significant. Among students who were recommended for developmental math, for the first four years of the period, those who did not enroll were more likely to succeed in BUS 121. For the last two years, however, the reverse has been true. But throughout the period, these differences do not reach the level of statistical significance, due to the relatively small number of cases in the various categories. In sum, the table does not indicate a clear relationship between enrollment in developmental math and success in the BUS 121 course.

In this case, however, the results of Table 9 are not especially useful, since there is a question as to whether all of the developmental math courses provide the specific skills needed for success in Business Math. It is more useful to look specifically at whether students have completed MTH 02 before taking BUS 121, at least for the years since 1996-97. A review of the enrollment histories of students enrolling in BUS 121 from 1994-95 through 1999-2000 reveals that only 23 of 473 students had enrolled in MTH 02 as their sole math preparation course prior to enrolling in BUS 121. An additional 53 students had enrolled in another developmental math course; and 146 students had enrolled in MTH 120 prior to BUS 121. The remaining 251 BUS 121 students had not enrolled in any of these math courses prior to Business Math. Table 10 documents the outcomes in BUS 121 by the specific math course taken previously.

Table 10.
Grade outcomes in Business Math (BUS 121),
by prior math course outcome
(Curriculum-placed students only)

Prior Math Course	Outcome of Math Course	BUS 121 Outcome		
		No.	% Pass[1]	Avg. Grade
MTH 02	Successful[2]	23	69.6	2.29
	Not Successful	0	--	--
MTH 03-05	Successful	42	76.2	2.45
	Not Successful	11	27.3	1.63
MTH 120	Successful	135	80.0	2.85
	Not Successful	11	36.4	2.50
No Prior MTH		251	81.7	2.97

[1] '% Pass' is the percentage of students receiving a grade of 'C' or better in BUS 121.

[2] "Successful" in the developmental math courses is defined as a grade of 'S'. For MTH 120, it is a grade of 'C' or better.

As previously noted, the number of students enrolling only in MTH 02 prior to the BUS 121 course is quite small; even so, *all* of the students who enrolled in BUS 121 and had taken MTH 02 had completed the developmental course successfully. Most of these were in the period since the course was reorganized in 1996-97. However, there were a total of 110 students who completed MTH 02 successfully between 1996-97 and 1999-2000, so it is clear that many of

them are not enrolling immediately in BUS 121. The number of students taking MTH 120 as a precursor to BUS 121 has declined in the last three years, while the number of students enrolling in primarily MTH 03 or 04 has remained steady, if small. (It should be noted that MTH 120 is no longer listed as a prerequisite for BUS 121, but the placement test score thresholds for these math courses have overlapped to some extent in the past.) A comparison of the BUS 121 success rates for students completing each of the math courses indicates that the students who completed only MTH 02 were the least successful among those students completing a math prerequisite. Although this evidence is not definitive, it does seem to indicate a need for further investigation of the appropriate placement and prerequisites for students enrolling in BUS 121.

Summary

- The analysis of outcomes in Business Math presents a mixed picture. There does not appear to be a relationship between placement recommendation and enrollment in developmental math courses and the outcome in BUS 121. Although less of the students who took a developmental math course were successful in BUS 121, the difference is not large.
- Further, it appears that only a small number of students is utilizing the recommended prerequisite of MTH 02 in preparation for BUS 121, and those students who do take MTH 02 do not necessarily fare as well as others. More analysis is called for, perhaps with detailed attention to the specific sequencing of developmental placement, advising, and enrollment.

Impact of developmental enrollment on student persistence

This section is drawn from a larger report entitled "Retention and Completion Patterns, Students Entering Fall 1990-99" (Office of Research and Planning, July 2000). In that report, the enrollment history of each student entering in the Fall semesters 1990 through 1999 is categorized according to one of three outcomes: completion of a degree or certificate; current enrollment as of Spring or Summer 2000; or "stopout". This definition of persistence is somewhat arbitrary, as it implies that each student who enrolls intends to complete a degree or certificate, and "should" be enrolled continuously until that point. This is not a valid assumption for community college students, many of whom are enrolling to obtain specific skills or knowledge or to transfer elsewhere without necessarily completing a degree. However, without further information on students' "true" goals for enrolling, a better analysis of persistence is not possible.

The full report provides for some further analysis by categorizing students according to their initial curriculum, and by analyzing other factors which might impact student persistence:

enrollment status (full-time versus part-time); race or ethnicity; and developmental background. It also provides breakdowns by specific program of initial enrollment. Table 7 of that report examines student persistence outcomes by developmental background. The following is excerpted from that table, and presents only the "stopout" rate for each developmental category. If developmental enrollment had an impact on student persistence, we would expect to see differences in the stopout rate between students who enroll in developmental courses and those who do not.

Table 11.
Proportion of students "stopping out" of further enrollment, by developmental background
(Curriculum-placed students only)

	Recommended[1]					Not Recommended				
Entry Term[2]	Enrolled[1]		Did Not Enroll			Enrolled		Did Not Enroll		
	No.	% Stopout[3]	No.	% Stopout	Sig.[4]	No.	% Stopout	No.	% Stopout	Sig.
Fall 1994	158	80.4	96	76.0		27	63.0	143	67.8	
Fall 1995	155	69.7	80	70.0		33	75.8	140	72.9	
Fall 1996	195	74.4	100	66.0		24	58.3	164	65.2	
Fall 1997	221	64.7	105	70.5		21	61.9	153	58.8	
Fall 1998	298	51.3	140	60.7	*	34	44.1	219	58.9	
Fall 1999	260	18.5	182	34.6	*	19	10.5	202	27.2	

[1] "Recommended" or "Not Recommended" for developmental courses. "Enrolled" or "Did Not Enroll" in any developmental course. This table does not specify whether the student enrolled in the specific recommended developmental course, or whether the student completed the developmental course successfully.

[2] The table does not present a trend analysis in the usual sense. Each entering cohort of students should be viewed separately, since each succeeding group has had less time to complete an award or return after stopping out. The stopout rate for Fall 1999 entrants is artificially low, since the analysis is based on Spring or Summer 2000 as the "current" term; the rate should increase to near the level of previous years when Fall 2000 enrollments are included.

[3] '% Stopout' is the percentage of students in the category who had not completed an award or enrolled for the Spring or Summer 2000 terms.

[4] Statistical significance: a '*' in this column indicates that there is a statistically significant relationship between enrollment in a developmental course and the proportion of students stopping out (O^2 test at $p < .05$).

Table 11 indicates that a student's developmental background does not have an effect on his or her likelihood of continuing enrollment toward an award. Most of the students who enroll at Germanna will stop out for some period of time without completing any degree or certificate. The table shows that students enrolling in developmental courses are no more or less likely to continue their enrollment than other students. The only two differences in the table which are

statistically significant are for the groups entering during the last two years. For Fall 1999 entrants especially, more of these students will likely stop out as time goes on. The fact that the stopout rate is higher for students who were recommended for developmental courses but have not yet enrolled does indicate that students who enroll in developmental courses may be more likely to remain enrolled longer before stopping out (or completing). This seems logical, since the developmental courses most likely represent a means to an end rather than an educational objective in and of themselves, and would therefore be followed by additional courses.

Summary

- Enrollment in a developmental courses does not make a student more or less likely to persist in his or her enrollment toward a degree or certificate.
- It appears that students who enroll in developmental courses may continue their enrollment longer before eventually stopping out or completing a degree.

Shortcomings in the present report

The present report is limited by several constraints, which should be considered before basing recommendations for action on these findings:

- As noted previously, the analysis is limited to data entered into the student information system. It does not include information on student's academic preparation other than recorded placement test scores and enrollment in Germanna courses.
- The pattern of student enrollments in the community college is inherently complicated. Students do not necessarily follow placement recommendations, do not necessarily enroll in courses in the recommended sequence, and may "stop out" of the College for an extended period between course enrollments. Many students are returning to the classroom after years of absence, which may make the comparison of student backgrounds and preparation less conclusive.
- Without a doubt, there is an intangible factor in student success which might be labeled "initiative" or "self-confidence". Many of the students in a community college setting may be unsure of their skills, which may affect their choice of courses. Placement test results may not reflect a student's abilities accurately, if the test is taken without appropriate preparation or without a clear understanding of its importance. An individual faculty or staff member can have a tremendous impact on the student's success, regardless of the student's preparation or prior experience. It is not possible to include an analysis of this intangible factor in a brief quantitative report such as the present one, yet it is a very real factor in student success.

Despite these shortcomings, the present report should expand on the base of information available, and as such represents a contribution toward the ongoing improvement of the placement and developmental education process.

Possible issues for further study

1. The present analysis does not specifically address the question of placement test score thresholds. This could be investigated by including the actual placement test score(s) in the analysis. However, this would also introduce an additional element of complexity into the analysis, which would not necessarily produce any more definitive results.

2. The present analysis is based only on data entered in the student information system. The analysis would be strengthened by including additional information on prior high school or college coursework. Again, however, this would produce a more complex analysis without a guarantee of more definitive results.

3. The present analysis does not attempt to account for time as a variable in the hypothesized relationship between prior academic preparation, placement, developmental coursework, and collegiate coursework. This could be introduced by including dates of the various testing and coursework items. It might be hypothesized that students enrolling directly from high school have a different outcome than students who have been away from the classroom for some time. Such an analysis would also factor in the recent shift in Germanna's enrollment toward more students entering directly from high school.

4. The present quantitative analysis should be supplemented by interviews with students regarding their placement and enrollment choices, as well as their experience in the classroom. This would help to illuminate the otherwise "intangible" elements in the placement process and course outcomes.